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A STUDY OF PRODUCTIVITY, RESEARCH ACTIVITIES, AND POSITIONS OF POST-WAR PH.D.'S IN MATHEMATICS.

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THIS REPORT PROVIDES INFORMATION ABOUT THE PUBLICATIONS AND PRESENT ACTIVITIES OF THE APPROXIMATELY 5,700 PH.D.'S IN MATHEMATICS GIVEN BY UNIVERSITIES IN THE UNITED STATES AND CANADA FROM 1945-65. THIS REPORT, COVERING THE 20-YEAR POST-WAR PERIOD, IS AN EXTENSION OF AN EARLIER ANALYSIS OF THE MATHEMATICS PH.D.'S GIVEN IN 1951. A VARIETY OF SOURCES WAS USED TO DETERMINE INFORMATION INCLUDING (1) THE NAMES OF THE PH.D. GRADUATES IN MATHEMATICS, (2) PRESENT POSITIONS AND FACULTY RANKS OF THE MEMBERS OF THE CLASSES STUDIED, AND (3) THE NUMBER OF PAPERS AND BOOKS PUBLISHED BY EACH PERSON. REPORTED ARE (1) THE TYPE OF EMPLOYMENT AND, FOR UNIVERSITY PERSONNEL, THE FACULTY RANK WHERE APPLICABLE FOR EACH CLASS, (2) THE DISTRIBUTION OF NUMBER OF PUBLICATIONS FOR EACH CLASS, (3) COMPARISONS BETWEEN THE PAPERS PUBLISHED BY PROFESSORS AT DIFFERENT TYPES OF UNIVERSITIES, (4) THE PERCENTAGES, FOR EACH CLASS, OF THOSE WHO HAVE PUBLISHED NO PAPERS, ONE PAPER, AND MORE THAN ONE PAPER, AND (5) THE NUMBER AND PERCENTAGE OF EACH CLASS WHO HAVE PUBLISHED AT A RATE OF MORE THAN ONE PAPER PER YEAR. ACCORDING TO THE CALCULATIONS, WHICH WERE DONE FOR THIS REPORT, IT WAS ESTIMATED THAT IN 1965 THERE WERE ROUGHLY 700 UNIVERSITY MATHEMATICIANS AVAILABLE WHO MET THE STANDARD OF HAVING PUBLISHED A PAPER A YEAR. WHEN CONSIDERING THE SIZE OF THE POOL OF 700 QUALIFIED THESIS DIRECTORS, THE GOALS STATED IN THE GILLILAND REPORT OF BETWEEN 1,300 AND 2,200 PH.D.'S PER YEAR IN MATHEMATICS BY 1970 SEEM IMPLAUSIBLY HIGH. (RP)

A STUDY OF PRODUCTIVITY, RESEARCH ACTIVITIES, AND POSITIONS OF POST-WAR Ph.D.'s IN MATHEMATICS

G. S. Young

In the twenty-year post-war period, 1945-65, there have been approximately 5,700 Ph.D.'s in mathematics given by universities in the United States and Canada. The purpose of this report is to say something about their publications and their present activities and to discuss some of the implications of these facts. This study is an extension of an earlier analysis [7] of the mathematics Ph.D.'s given in the year 1951. The present report is based on comparable data for the Ph.D. classes of 1945, 1948, 1954, 1957, 1960, and 1962.

1. Procedure The names of the Ph.D. graduates in mathematics were taken from a list of such degrees published annually by the American Mathematical Society.

The present positions and faculty ranks of the members of the classes studied were determined by looking first in the Combined Membership List, which is published jointly by the American Mathematical Society, the Mathematical Association of America, and the Society for Industrial and Applied Mathematics. This list includes all persons who are members of any of these organizations. Next the latest issue of the American men of Science was examined. For people still unlocated, a letter was written to the Graduate School asking the Graduate School for information as to the person's whereabouts. If a person was located through the Graduate School, but insufficient detail was given as to his present employment, a letter was written to him asking for further information. A surprising number of people remained unlocated by any of the the means; it is my subjective impression that for the most part these were students of foreign origin who have returned home, or persons taking degrees in areas such as computing or operations research somewhat out of the main stream of mathematics and who have found employment outside the normal mathematical fields. However, it is clearer that some of the people we have not been able to locate are deceased, and some of them are women who have married and changed their names, and perhaps been removed from the field.

The number of papers and books published by each person was determined by searching the index of the Mathematical Reviews. Mathematical Reviews does not attempt to review elementary textbooks so the books reviewed there and entered in the tables of this report are mainly scholarly books or advanced textbooks. However, this does not entirely account for the small number of books; independent evidence from the recent COLFACS survey [6] indicates that mathematicians as a group are less prolific publishers of books (and papers) than are those in other disciplines.

Another and more important consequence of using the Mathematical Reviews to determine publications is that, due to delay in reviewing, the totals represent papers published through 1963 or 1964. Thus the productivity of the class of 1962 is probably understated; to a smaller extent this is probably also true of the class of 1960.

In the tables which follow, the term "University" is used to include all institutions of higher education; the term "Industry" includes employment by corporations or self-employment or anything else that is clearly not teaching or government work. The term "unknown" means that the person was not located by the measure described above. The category "Foreign" is composed of persons receiving Ph.D.'s in mathematics from American universities but now residing abroad.

2. Positions Table 1 gives successively class by class the type of employment and, for university personnel, the faculty rank where applicable. The distribution of all 1554 Ph.D.'s covered by the survey is as follows:

	N	Percent
University	962	61.9
Industry	194	12.5
Government	46	3.0
Foreign	100	6.4
Deceased and Unknown	252	16.2
Total	1554	100

There were 5700 Ph.D.'s in mathematics given between 1945 and 1965. The application of these percentages to the larger number gives

	N
University	3528
Industry	713
Government	171
Deceased and Unknown	923
Foreign	365
Total	5700

A crude application of standard mortality tables to the number of Ph.D.'s granted in each year before 1945 gives a guess that in 1965 there were still alive and still under 65 some 800 mathematicians with Ph.D.'s from before 1945.

So, as a rough estimate, there were approximately 6000 American trained mathematics Ph.D.'s in the labor force at the end of 1965.

It is interesting to speculate about the category, Deceased and Unknown. The mathematicians covered in this survey all are young enough that the actual number of deceased persons must be quite small. Unless most of the balance are in industry, the industrial community is making do with a surprisingly small number of Ph.D. mathematicians.

One thing that is probably true is that very few in the "unknown" category are in universities. Let us suppose for the purposes of making comparisons, that none are in universities, a pessimistic assumption from the standpoint of college teaching.

The figure of 61.9 percent in college teaching is higher than that given for most years by Maul [3] for the percentage of new mathematics doctorates entering or remaining in college teaching. If the figures of the present study are correct, it follows either that Maul's figures are unduly low or that the net flow of mathematics Ph.D.'s after their first post-doctoral job has been from industry into teaching contrary to the popularly held belief that the new flow has been out of teaching into other employment.

It is worth remarking that if the 61.9 percent figure is multiplied by the number of Ph.D.'s from 1945 to 1962 (rather than 1965) and if it is assumed that virtually all pre-war Ph.D.'s who are still active are in college teaching, the result is in substantial agreement with the results of the Office of Education COLFACS Survey [6] done in 1962-63.

Table 1 also lists class by class the mean number of papers published by professors of different faculty ranks. The tables show vividly the influence of publication on promotion. The university professors as a group are consistently more prolific than other groups.

3. Publications Table 2 gives the distribution of number of publications for each class. These distributions are all roughly similar in general shape. The number who have published no papers or only one paper is mildly surprising. Out of 1148 Ph.D.'s in all of the classes excluding 1962, a total of 339 had published nothing and 222 had published only one paper. Thus almost exactly half can be said to have published nothing except possibly their theses.

The class of 1962 is a special case. Only 16 percent of this class had published more than one paper. This extremely low percentage is almost certainly due to the short time which the members of the class have had to produce papers - barely enough time to have a paper published and reviewed. In reading Table 2 one should keep in mind that the figures are not publication rates but total accumulations so that comparisons among classes should be made with caution.

Table 3 gives comparisons between the papers published by professors at different types of universities. The author selected a list of what he felt were the strongest 25 departments and measured rank and publication in these; he then did the same for the other schools. The recent Cartter study by the ACE gives a list of the 25 strongest

departments in mathematics. The author measured rank and publication in these schools; he then did the same for the other schools. Table 3 also gives publication rates in the last column. These were determined by dividing the mean number of papers for a certain group by the number of years the members of that group have had since their Ph.D.'s were granted. It is interesting to compute for each class the percentage of professors who teach at the 25 strong schools:

Class	Percent at the 25 Strong Schools
1945	29
1948	40
1951	42
1954	31
1957	29
1960	34
1962	30

Table 4 gives for each class the percentages who have published no papers, one paper, and more than one paper.

Table 5 shows the number and percentage of each class who have published at a rate of more than one paper per year. The trend is definitely downward with time. It is tempting but probably hazardous to draw conclusions from this about the trends in quality of Ph.D.'s.

4. Implications Combining the data of the present study with data from other sources, it is possible to make a rough estimate of the total number of mathematicians who were qualified to direct Ph.D. thesis, say, in 1965. The report of a recent Conference Board meeting of Manpower Problems in the Training of Mathematicians [2] gives a paper a year as a crude quantitative measure of publication to tell whether a person should supervise theses.

First of all, studies by H. O. Pollak [4] indicate that the Ph.D.'s of 1963 and 1964 probably produced almost no Ph.D.'s in 1965, so we exclude these classes from consideration as prospective thesis supervisors.

From Table 5 together with the number of Ph.D.'s given in the classes covered by this study, I calculate that 12.4 percent of the Ph.D.'s in these years have published more than one paper a year. Omitting the class of 1962 raises the percentage to 14.4. Applying the percentage to the total number of Ph.D.'s produced in the years 1945 through 1962 gives an estimate of 554 potential thesis supervisors available from this source. To this must be added some estimate of the available thesis supervisors trained in years prior to 1945. Applying the 14.4 percentage to the previously estimated 800 such persons gives an additional 115 Ph.D. supervisors in 1965 or a total of 670.

To this figure should be added mathematicians having foreign doctorates. Pollak's data give 97 people with foreign doctorates who actually directed at least one thesis at an American university during the seven year period 1957-63. Adding all of these to the previous total gives 767.

From these figures must be subtracted the number of otherwise qualified persons who because of employment outside American universities are unable to direct theses. The various parts of Table 1 confirm the intuitive impression that the publication rates of mathematicians outside universities are much lower than those of university mathematicians and hence this group would be expected to contain a smaller proportion of persons meeting the publication requirements of at least a paper a year. Applying a 7 percent rate to industry and government, a 14.4 percent rate to foreign mathematicians trained in the United States and a zero percent rate to those deceased and unknown, one obtains a total of 98 potential thesis supervisors outside universities, almost exactly counteracting the number of thesis supervisors of foreign origin. This gives a crude extimate of 669, which I round off to 700.

So there was available in 1965 a pool of roughly 700 mathematicians in universities who meet the standard of having published a paper a year.

The Pollak study referred to earlier found a total of 811 professors who had direct at least one Ph.D. thesis during the seven year period 1957-1963. Not all of these could be in our pool of 700 but 330 out of these 811 directed only one thesis and thus might be thought of as occasional thesis directors. Only 13 percent of the professors in Pollak's study directed theses at the rate of at least one a year during this seven year period. Many of these probably did so due to a "bunching phenomenon"; only a very few of the 13 percent could be expected to produce students at the rate of one a year over a long period of time. The most common rate of Ph.D. production was between .4 and .6 per year.

Considering the size of the pool of 700 qualified thesis directors and the rates of performance of Ph.D. thesis directors as recorded by Pollak, the goals stated in the Gilliland report [5] of between 1300 and 2200 Ph.D.'s per year in mathematics by 1970 seem implausibly high.

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TABLE 1. LOCATION AND RANK OF Ph.D.'s IN MATHEMATICS

Class of 1945

Group	Number		Papers		Mean Number of Papers
	N	%	N	%	
Univ.Per.					
Prof.	13	50.0	242	89.3	18.6
Asso. Prof.	4	15.4	3	1.1	.8
Asst. Prof.	0	0	0	0	0
Admin.	0	0	0	0	0
Other	0	0	0	0	0
Unknown	0	0	0	0	0
All Univ.Per.	17	65.4	245	90.4	14.4
Academic	1	3.8	0	0	0
Industry	2	7.7	2	.7	1.0
Government	0	0	0	0	0
Foreign	1	3.8	2	.7	2.0
Deceased	3	11.5	21	7.7	7.0
Unknown	2	7.7	1	.4	.5
Total	26	99.9	271	99.9	10.4

Class of 1948

Group	Number		Publication				Mean Number of Papers
			Number		Percent		
	N	%	Papers	Books	Papers	Books	
Univ. Per.							
Prof.	57	46.3	955	10	71.1	76.9	16.8
Asso.Prof.	15	12.2	83	0	6.2	0	5.5
Asst.Prof.	4	3.3	9	0	7	0	2.3
Admin.	2	1.6	2	0	.1	0	1.0
Other	3	2.4	5	2	.4	15.4	1.7
Unknown	5	4.1	21	0	1.6	0	4.2
All Univ.Per.	86	69.9	1075	12	80.1	92.3	12.5
Industry	9	7.3	40	0	3.0	0	4.4
Government	4	3.3	3	0	.2	0	.8
Foreign	6	4.9	32	0	2.4	0	5.3
Deceased	2	1.6	41	0	3.0	0	20.5
Unknown	16	13.0	152	1	11.3	7.7	9.5
Total	123	100.0	1343	13	100.0	100.0	10.9

Class of 1951

Group	Number		Papers		Mean Number of Papers
	N	%	N	%	
Univ. Per.					
Prof.	68	31.4	584	49.9	8.6
Asso.Prof.	45	20.7	222	19.0	4.9
Asst.Prof.	13	6.0	79	6.8	6.1
Admin.	18	8.3	68	5.8	3.8
All Univ. Per.	144	66.4	953	81.5	6.6
Industry and Govt.	45	20.7	130	11.1	2.9
Unknown	28	12.9	87	7.4	3.1
Total	217	100.0	1,170	100.0	5.4

Class of 1954

Group	Number		Publication				Mean Number of Papers
			Number		Percent		
	N	%	Papers	Books	Papers	Books	
Univ. Per							
Prof.	72	29.1	584	5	46.2	62.5	8.1
Asso.Prof.	56	22.6	282	1	22.3	12.5	5.0
Asst.Prof.	14	5.6	61	1	4.9	12.5	4.4
Admin.	0	0	0	0	0	0	0
Other	4	1.6	22	0	1.7	0	5.5
Unknown	3	1.2	12	0	.9	0	4.0
All Univ.Per.	149	60.1	961	7	76.0	87.5	6.4
Industry	33	13.3	95	1	7.5	12.5	2.9
Government	9	3.6	19	0	1.5	0	2.1
Foreign	14	5.6	54	0	4.3	0	3.9
Deceased	3	1.2	3	0	.2	0	1.0
Unknown	40	16.1	132	0	10.4	0	3.3
Total	248	99.9	1264	8	99.9	100.0	5.1

Class of 1957

Group	Number		Publication				Mean Number of Papers
			Number		Percent		
	N	%	Papers	Books	Papers	Books	
Univ.Per.							
Prof.	38	16.8	152	2	23.9	50.0	4.0
Asso. Prof.	60	26.5	224	0	35.3	0	3.7
Asst. Prof.	16	7.1	35	0	5.5	0	2.2
Admin.	2	.9	0	0	0	0	0
Other	7	3.1	25	0	3.9	0	3.6
Unknown	3	1.3	2	0	.3	0	.7
All Univ.Per	126	55.7	438	2	68.9	50.0	3.5
Industry	36	15.9	65	1	10.2	25.0	1.8
Government	9	4.0	9	0	1.4	0	1.0
Foreign	11	4.9	47	1	7.4	25.0	4.3
Deceased	0	0	0	0	0	0	0
Unknown	44	19.5	76	0	12.0	0	1.7
Total	226	100.0	635	4	99.9	100.0	2.8

Class of 1960

Group	Number		Publication				Mean Number of Papers
			Number		Percent		
	N	%	Papers	Books	Papers	Books	
Univ.Per.							
Prof.	15	4.9	31	0	5.7	0	2.1
Asso.Prof.	63	20.5	162	1	29.7	50.0	2.6
Asst.Prof	73	23.7	131	0	24.0	0	1.8
Admin.	2	.6	0	0	0	0	0
Other	17	5.5	32	0	5.9	0	1.9
Unknown	10	3.2	21	1	3.9	50.0	2.1
All Univ.Per.	180	58.4	377	2	69.2	100.0	2.1
Industry	35	11.4	34	0	6.2	0	1.0
Government	9	2.9	14	0	2.6	0	1.6
Foreign	29	9.4	58	0	10.6	0	2.0
Deceased	2	.6	2	0	.4	0	1.0
Unknown	51	16.6	59	0	10.8	0	1.2
Total	308	99.9	545	2	100.0	100.0	1.8

Class of 1962

Group	Number		Publication				Mean Number of Papers
			Number		Percent		
	N	%	Papers	Books	Papers	Books	
Univ. Per.							
Prof.	8	2.0	7	0	2.5	0	.9
Asso.Prof.	31	7.6	15	0	5.4	0	.5
Asst.Prof.	164	40.4	114	3	41.2	100.0	.7
Admin.	1	.2	1	0	.4	0	1.0
Other	21	5.2	14	0	5.1	0	.7
Unknown	35	8.6	27	0	9.7	0	.8
All Univ.Per.	260	64.0	178	3	64.3	100.0	.7
Industry	33	8.1	18	0	6.5	0	.5
Government	15	3.7	11	0	4.0	0	.7
Foreign	39	9.6	32	0	11.6	0	.8
Deceased	0	0	0	0	0	0	0
Unknown	59	14.5	38	0	13.7	0	.6
Total	406	99.9	277	3	100.1	100.0	.7

TABLE 2. DISTRIBUTION OF PUBLISHED PAPERS

Class of 1945

Number of Papers	Number of Persons	Cumulative
$60 \geq n \geq 50$	2	2
$50 > n \geq 40$	1	3
$40 > n \geq 30$	1	4
$30 > n \geq 20$	1	5
$20 > n \geq 10$	2	7
$10 > n \geq 5$	2	9
$n = 4$	0	9
$n = 3$	1	10
$n = 2$	3	13
$n = 1$	4	17
$n = 0$	9	26

Note: The largest number was 59.

Class of 1948

Number of Papers	Number of Persons	Cumulative
≥ 90	1	1
$90 > n \geq 80$	0	1
$80 > n \geq 70$	1	2
$70 > n \geq 60$	1	3
$60 > n \geq 50$	2	5
$50 > n \geq 40$	5	10
$40 > n \geq 30$	3	13
$30 > n \geq 20$	11	24
$20 > n \geq 10$	16	40
$10 > n \geq 5$	16	56
$n = 4$	8	64
$n = 3$	10	74
$n = 2$	10	84
$n = 1$	15	99
$n = 0$	24	123

Note: The largest number was 92.

Class of 1951

Number of Papers	Number of Persons	Cumulative
$n \geq 20$	16	16
$20 > n \geq 10$	24	40
$10 > n \geq 5$	42	82
$n = 4$	13	95
$n = 3$	18	113
$n = 2$	20	133
$n = 1$	44	177
$n = 0$	40	217

Class of 1954

Number of Papers	Number of Persons	Cumulative
$70 \geq n \geq 60$	1	1
$60 > n \geq 50$	0	1
$50 > n \geq 40$	3	4
$40 > n \geq 30$	0	4
$30 > n \geq 20$	7	11
$20 > n \geq 10$	34	45
$10 > n \geq 5$	39	84
$n = 4$	10	94
$n = 3$	23	117
$n = 2$	29	146
$n = 1$	39	185
$n = 0$	63	248

The largest Number was 67.

Class of 1957

Number of Papers	Number of Persons	Cumulative
$30 \geq n \geq 20$	3	3
$20 > n \geq 10$	14	17
$10 > n \geq 5$	34	51
$n = 4$	9	60
$n = 3$	14	74
$n = 2$	19	93
$n = 1$	52	145
$n = 0$	81	226

Note: The largest number published was 23

Class of 1960

Number of Papers	Number of Persons	Cumulative
$20 \geq n \geq 10$	3	3
$10 > n \geq 5$	32	35
$n = 4$	21	56
$n = 3$	27	83
$n = 2$	35	118
$n = 1$	68	186
$n = 0$	122	308

The largest number published was 13

Class of 1962

Number of Papers	Number of Persons	Cumulative
$n=12$	1	1
$n=11$	0	1
$n=10$	0	1
$n=9$	0	1
$n=8$	1	2
$n=7$	1	3
$n=6$	0	3
$n=5$	3	6
$n=4$	3	9
$n=3$	17	26
$n=2$	39	65
$n=1$	94	159
$n=0$	247	406

TABLE 3. SCHOOLS, RANKS, AND PUBLICATIONS

Class of 1945

Group	Number N	Number %	Papers N	Papers %	Mean Number of Papers	Mean ± 19 Yrs.
Twenty-five Strong Schools						
Prof.	5	29.4	159	64.9	31.8	1.67
Assoc. Prof.	0	0	0	0	0	
Asst. Prof.	0	0	0	0	0	
Admin.	0	0	0	0	0	
Other	0	0	0	0	0	
Unknown	0	0	0	0	0	
Total	5	29.4	159	64.9	31.8	
Other Universities						
Prof.	8	47.1	83	33.9	10.375	.55
Assoc. Prof.	4	23.5	3	1.2	.75	.04
Asst. Prof.	0	0	0	0	0	0
Admin.	0	0	0	0	0	0
Other	0	0	0	0	0	
Unknown	0	0	0	0	0	
Total	12	70.6	86	35.1	7.2	
All Universities						
Prof.	13	76.5	242	98.8	18.615	.98
Assoc. Prof.	4	23.5	3	1.2	.75	.04
Asst. Prof.	0	0	0	0	0	
Admin.	0	0	0	0	0	
Other	0	0	0	0	0	
Unknown	0	0	0	0	0	
Total	17	100.0	245	100.0	14.4	

Class of 1948

Group	Number N	Number %	Papers N	Papers %	Mean Number of Papers	Mean ÷ 16 Yrs.
Twenty-five Strong Schools						
Prof.	23	26.7	671	62.4	29.174	1.82
Asso. Prof.	4	4.7	47	4.4	11.75	.73
Asst. Prof.	1	1.2	5	.5	5.0	.31
Admin.	1	1.2	2	.2	2.0	
Other	3	3.5	5	.5	1.7	
Unknown	2	2.3	17	1.6	8.5	
Total	34	39.6	747	69.6	22.0	
Other Universities						
Prof.	34	39.5	284	26.4	8.353	.52
Asso. Prof.	11	12.8	36	3.3	3.273	.20
Asst. Prof.	3	3.5	4	.4	1.333	.08
Admin.	1	1.2	0	0	0	
Other	0	0	0	0	0	
Unknown	3	3.5	4	.4	1.3	
Total	52	60.5	328	30.5	6.3	
All Universities						
Prof.	57	66.2	955	88.8	16.754	1.05
Asso. Prof.	15	17.5	83	7.7	5.533	.35
Asst. Prof.	4	4.7	9	.9	2.25	.14
Admin.	2	2.4	2	.2	1.0	
Other	3	3.5	5	.5	1.7	
Unknown	5	5.8	21	2.0	4.2	
Total	86	100.1	1075	100.1	12.5	

Class of 1951

Group	Number N	Number %	Papers N	Papers %	Mean Number of Papers	Mean $\frac{s}{\sqrt{n}}$ 13 Yrs.
Twenty -five Strong Schools						
Prof.	29	20.1	435	45.6	15.0	1.15
Assoc. Prof.	17	11.8	107	11.2	6.3	.48
Asst. Prof.	6	4.2	51	5.4	8.5	.65
Other	9	6.3	58	6.1	6.4	
Total	61	42.4	651	68.3	10.7	
Other Universities						
Prof.	39	27.1	149	15.6	3.8	.29
Assoc. Prof.	28	19.4	115	12.1	4.1	.32
Asst. Prof.	7	4.9	28	2.9	4.0	.31
Other	9	6.2	10	1.1	1.1	.31
Total	83	57.6	302	31.7	3.6	
All Universities						
Prof.	68	47.2	584	61.3	8.6	.66
Assoc. Prof.	45	31.3	222	23.3	4.9	.38
Asst. Prof.	13	9.0	79	8.3	6.1	.47
Other	18	12.5	68	7.1	3.8	
Total	144	100.0	953	100.1		

Class of 1954

Group	Number N	Number %	Papers N	Papers %	Mean Number of Papers	Mean 10 yrs.
Twenty-five Strong Schools						
Prof.	23	15.4	288	30.0	12.522	1.25
Asso. Prof.	15	10.1	131	13.6	8.733	.87
Asst. Prof.	5	3.4	46	4.8	9.2	.92
Admin.	0	0	0	0	0	0
Other	3	2.0	20	2.1	6.7	
Unknown	0	0	0	0	0	
Total	46	30.9	485	50.5	10.5	
Other Universities						
Prof.	49	32.9	296	30.8	6.041	.60
Asso. Prof.	41	27.5	151	15.7	3.683	.37
Asst. Prof.	9	6.0	15	1.6	1.667	.17
Admin.	0	0	0	0	0	
Other	1	.7	2	.2	2.0	
Unknown	3	2.0	12	1.2	4.0	
Total	103	69.1	476	49.5	4.6	
All Universities						
Prof.	72	48.3	584	60.8	8.111	.81
Asso. Prof.	56	37.6	282	29.3	5.036	.50
Asst. Prof.	14	9.4	61	6.4	4.357	.44
Admin.	0	0	0	0	0	
Other	4	2.7	22	2.3	5.5	
Unknown	3	2.0	12	0	1.2	4.0
Total	149	100.0	961	100.0	6.4	

Class of 1957

Group	Number N	Number %	Papers N	Papers %	Mean Number of Papers	Mean ± 7 Yrs.
Twenty-five Strong Universities						
Prof.	10	7.9	88	20.1	8.8	1.26
Asso.Prof.	13	10.3	81	18.5	6.231	.89
Asst.Prof.	6	4.8	24	5.5	4.0	.57
Admin.	0	0	0	0	0	
Other	6	4.8	25	5.7	4.2	
Unknown	2	1.6	0	0	0	
Total	37	29.4	218	49.8	5.9	
Other Universities						
Prof.	28	22.2	64	14.6	2.286	.33
Asso. Prof.	47	37.3	143	32.6	3.043	.43
Asst. Prof.	10	7.9	11	2.5	1.1	.16
Admin.	2	1.6	0	0	0	
Other	1	.8	0	0	0	
Unknown	1	.8	2	.5	2.0	
Total	89	70.6	220	50.2	2.5	
All Universities						
Prof.	38	30.1	152	34.7	4.0	.57
Asso. Prof.	60	47.6	224	51.1	3.733	.53
Asst. Prof.	16	12.7	35	8.0	2.188	.31
Admin.	2	1.6	0	0	0	
Other	7	5.6	25	5.7	3.6	
Unknown	3	2.4	2	.5	.7	
Total	126	100.0	438	100.0	3.5	

Class of 1960

Group	Number N	Number %	Papers N	Papers %	Mean Number of Papers	Mean ÷ 4 Yrs.
Twenty-five Strong Schools						
Prof.	1	.6	2	.5	2.0	.50
Asso. Prof.	11	6.1	52	13.8	4.727	1.18
Asst. Prof.	34	18.9	89	23.6	2.618	.65
Admin.	0	0	0	0	0	0
Other	10	5.6	18	4.8	1.8	
Unknown	6	3.3	14	3.7	2.3	
Total	62	34.5	175	46.4	2.8	
Other Universities						
Prof.	14	7.8	29	7.7	2.072	.52
Asso.Prof.	52	28.9	110	29.2	2.115	.53
Asst.Prof.	39	21.7	42	11.1	1.077	.27
Admin.	2	1.1	0	0	0	
Other	7	3.9	14	3.7	2.0	
Unknown	4	2.2	7	1.9	1.8	
Total	118	65.6	202	53.6	1.7	
All Universities						
Prof.	15	8.4	31	8.2	2.067	.52
Asso. Prof.	63	35.0	162	43.0	2.571	.64
Asst. Prof.	73	40.6	131	34.7	1.794	.45
Admin.	2	1.1	0	0	0	
Other	17	9.5	32	8.5	1.9	
Unknown	10	5.5	21	5.6	2.1	
Total	180	100.0	377	60.0	2.1	

Class of 1962

Group	Number N	Number %	Papers N	Papers %	Mean Number of Papers	Mean 2 yrs.
Twenty-five Strong Schools						
Prof.	1	.4	2	1.1	2.0	1.0
Asso. Prof.	1	.4	3	1.7	3.0	1.5
Asst. Prof.	49	18.8	45	25.3	.918	.46
Admin.	0	0	0	0	0	
Other	12	4.6	7	3.9	.6	
Unknown	15	5.8	16	9.0	1.1	
Total	78	30.0	73	41.0	.9	
Other Universities						
Prof.	7	2.7	5	2.8	.714	.36
Asso.	30	11.5	12	6.7	.4	.20
Asst.	115	44.2	69	38.8	.6	.30
Admin.	1	.4	1	.6	1.0	
Other	9	3.5	7	3.9	.8	
Unknown	20	7.7	11	6.2	.6	
Total	182	70.0	105	59.0	.6	
All Universities						
Prof.	8	3.1	7	3.9	.875	.44
Asso. Prof.	31	11.9	15	8.4	.484	.24
Asst. Prof.	164	63.0	114	64.1	.695	.35
Admin.	1	.4	1	.6	1.0	
Other	21	8.1	14	7.8	.7	
Unknown	35	13.5	27	15.2	.8	
Total	260	100.0	178	100.0	.7	

TABLE 4. PERCENTAGES HAVING GIVEN NUMBERS OF PAPERS

Percentages	0 Papers	1 Paper	≤1 Paper	>1 Paper
1945	34.6	15.4	50.0	50.0
1948	19.5	12.2	31.7	68.3
1951	18.4	20.3	38.7	61.3
1954	25.4	15.7	41.1	58.9
1957	35.8	23.0	58.8	58.8
1960	39.6	22.1	61.7	38.3
1962	60.8	23.2	84.0	16.0

TABLE 5. NUMBER AND PERCENT HAVING >1 PAPER A YEAR

Year	No. With >1 Paper a Year	Percent
1945	5	19.2
1948	26	21.1
1951	39	18.0
1954	37	14.9
1957	24	10.6
1960	35	11.4
1962	26	6.4